



NUCLEAR REGULATORY COMMISSION

[Docket No. 50-425; NRC-2023-0092]

Southern Nuclear Operating Company; Vogtle Electric Generating Plant, Unit 2

AGENCY: Nuclear Regulatory Commission.

ACTION: Exemption; issuance.

SUMMARY: The U.S. Nuclear Regulatory Commission (NRC) has issued an exemption in response to a request dated June 30, 2022, as supplemented by letters dated September 13, 2022, and January 20, and May 5, 2023, from Southern Nuclear Operating Company to allow the use of AXIOM fuel rod cladding material in lead test assemblies 7ST1, 7ST2, 7ST3, and 7ST4, for up to two cycles of operation at Vogtle Electric Generating Plant, Unit 2.

DATES: The exemption was issued on August 1, 2023.

ADDRESSES: Please refer to Docket ID **NRC-2023-0092** when contacting the NRC about the availability of information regarding this document. You may obtain publicly available information related to this document using any of the following methods:

- **Federal Rulemaking Website:** Go to <https://www.regulations.gov> and search for Docket ID **NRC-2023-0092**. Address questions about Docket IDs in Regulations.gov to Stacy Schumann; telephone: 301-415-0624; email: Stacy.Schumann@nrc.gov. For technical questions, contact the individual listed in the "For Further Information Contact" section of this document.

- **NRC's Agencywide Documents Access and Management System**

(ADAMS): You may obtain publicly available documents online in the ADAMS Public Documents collection at <https://www.nrc.gov/reading-rm/adams.html>. To begin the search, select "Begin Web-based ADAMS Search." For problems with ADAMS, please contact the NRC's Public Document Room (PDR) reference staff at 1-800-397-4209, 301-415-4737, or by email to PDR.Resource@nrc.gov. The ADAMS accession number

for each document referenced (if it is available in ADAMS) is provided the first time that it is mentioned in this document.

- **NRC's PDR:** The PDR, where you may examine and order copies of publicly available documents, is open by appointment. To make an appointment to visit the PDR, please send an email to PDR.Resource@nrc.gov or call 1-800-397-4209 or 301-415-4737, between 8 a.m. and 4 p.m. eastern time (ET), Monday through Friday, except Federal holidays.

FOR FURTHER INFORMATION CONTACT: John G. Lamb, Office of Nuclear Reactor Regulation, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001; telephone: 301-415-3100; email: John.Lamb@nrc.gov.

SUPPLEMENTARY INFORMATION: The text of the exemption is attached.

Dated: August 2, 2023.

For the Nuclear Regulatory Commission.

John G. Lamb,
*Senior Project Manager,
Licensing Plant Branch 2-1,
Division of Operating Reactor Licensing,
Office of Nuclear Reactor Regulation.*

Attachment – Exemption from 10 CFR Part 50, Appendix K, for Vogtle, Unit 2, to Allow the Use of AXIOM Fuel Rod Cladding Material in Lead Test Assemblies

NUCLEAR REGULATORY COMMISSION

Docket No. 50-425

Southern Nuclear Operating Company

Vogtle Electric Generating Plant, Unit 2

Exemption

I. Background.

Southern Nuclear Operating Company (SNC, the licensee) is the holder of Facility Operating License No. NPF-81, for the Vogtle Electric Generating Plant (Vogtle), Unit 2. The license provides, among other things, that the license is subject to all rules, regulations, and orders of the Commission now or hereafter in effect.

The Vogtle, Unit 2, consists of a pressurized-water reactor located at the licensee's site in Burke County, Georgia.

II. Request/Action.

By letter dated June 30, 2022 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML22181B156), as supplemented by letters dated September 13, 2022 (ML22256A198), January 20, 2023 (ML23020A148), and May 5, 2023 (ML23125A269), SNC requested an exemption to title 10 of the *Code of Federal Regulations* (10 CFR), part 50, appendix K, "ECCS [Emergency Core Cooling Systems] Evaluation Models," for Vogtle, Unit 2.

Specifically, SNC requested an exemption from 10 CFR part 50, appendix K to allow the use of AXIOM fuel rod cladding material in lead test assemblies (LTAs) 7ST1, 7ST2, 7ST3, and 7ST4 for up to two cycles of operation at Vogtle, Unit 2.

The regulation at 10 CFR 50.46(a)(1)(ii) provides that, “[a]lternatively, an ECCS evaluation model may be developed in conformance with the required and acceptable features of Appendix K ECCS Evaluation Models.” Appendix K of 10 CFR part 50 requires, in paragraph I.A.5, that “[t]he rate of energy release, hydrogen generation, and cladding oxidation from the metal/water reaction shall be calculated using the Baker-Just equation (Baker, L., Just, L.C., ‘Studies of Metal Water Reactions at High Temperatures, III. Experimental and Theoretical Studies of the Zirconium Water Reaction,’ ANL-6548, page 7, May 1962).” The regulations make no provisions for use of fuel rods clad in a material other than zircaloy or ZIRLO. Since the Baker-Just equation presumes the use of zircaloy or ZIRLO clad fuel, strict application of this provision of the rule would not permit use of the equation for AXIOM cladding for determining acceptable fuel performance.

III. Discussion.

Pursuant to 10 CFR 50.12, the NRC may, upon application by any interested person or upon its own initiative, grant exemptions from the requirements of 10 CFR part 50, including 10 CFR part 50, appendix K when: (1) the exemptions are authorized by law, will not present an undue risk to the public health or safety, and are consistent with the common defense and security; and (2) when special circumstances are present. Under 10 CFR 50.12(a)(2), special circumstances include, among other things, when application of the specific regulation in the particular circumstances would not serve, or is not necessary to achieve, the underlying purpose of the rule.

A. The Exemption is Authorized by Law.

In accordance with 10 CFR 50.12, the NRC may grant an exemption from the requirements of 10 CFR part 50 if the exemption is authorized by law. The exemption requested in this instance is authorized by law, because no other prohibition of law

exists to preclude the activities which would be authorized by the exemption.

This exemption would allow the licensee to insert four LTAs containing AXIOM fuel rod cladding that is neither Zircaloy nor ZIRLO, which are the cladding materials contemplated by 10 CFR 50.46(a)(1)(i). Selection of a specific cladding material in 10 CFR 50, appendix K was at the discretion of the Commission consistent with its statutory authority. No statute required the NRC to adopt this specification. As stated above, 10 CFR 50.12 allows the Commission to grant exemptions from the requirements of 10 CFR part 50. The NRC staff has determined that granting of an exemption from 10 CFR part 50, appendix K related to AXIOM fuel rod cladding, which is neither Zircaloy nor ZIRLO, will not result in a violation of the Atomic Energy Act of 1954, as amended, or the Commission's regulations. Therefore, the exemption is authorized by law.

B. The Exemption Presents no Undue Risk to Public Health and Safety.

SNC stated the following in its letter dated June 30, 2022:

The Vogtle reactors each contain 193 fuel assemblies. Each assembly consists of a matrix of 264 Zircaloy, ZIRLOTM®, or Optimized ZIRLO[®]™ clad fuel rods with an initial composition of natural or slightly enriched uranium dioxide (UO₂) as fuel material, not to exceed 5 wt% [weight-percent] enrichment. The proposed change is to load four LTAs with advanced ATF [accident tolerant fuel] features, including ADOPT fuel [2], AXIOM cladding [3], chromium coating, and four rods per LTA with up to 6 wt% enrichment, in limiting core locations for up to two cycles of operation.

This exemption will not present an undue risk to public health and safety. Reload evaluations ensure that acceptance criteria are met for the insertion of LTAs with fuel rods clad with AXIOM material. Due to similarities in the composition of the AXIOM alloy and the Optimized ZIRLO and standard ZIRLO alloys, fuel assemblies using AXIOM fuel rod cladding are evaluated using plant-specific models to address the changes in the cladding material properties. The LOCA [loss-of-coolant accident] safety analyses for VEGP [Vogtle Electric Generating Plant] are supported by the applicable site-specific Technical Specifications (TS). Reload cores are required to be operated in accordance with the operating limits specified in the TS. Thus, the granting of this exemption request will not pose an undue risk to public health and safety.

Based upon the limited number of AXIOM clad fuel rods, the safeguards in place which would detect anomalous behavior, the use of NRC-approved models to ensure that all design criteria remain satisfied, and the requirement to operate the Vogtle, Unit 2,

core within TS limits, the NRC staff finds the four LTAs acceptable for Vogtle, Unit 2. In conclusion, the NRC staff finds that the requested exemption does not result in any undue risk to the public health and safety, because (1) the NRC staff has determined that the use of AXIOM cladding in this application is acceptable because there is no expected loss of safety margin associated with the use of AXIOM cladding in the pertinent limiting core locations,¹ (2) the NRC staff has determined that SNC's evaluation of coated cladding emissivity and its effect on loss-of-coolant accident peak clad temperature (PCT) is acceptable, because data was provided demonstrating no significant difference in PCT, (3) the NRC staff has determined that SNC's evaluation of ADOPT fuel pellets in the LTAs is acceptable, because there will be no reduction in fuel performance and the applicable limitations and conditions have been implicitly addressed, and (4) the number of rods with enrichments exceeding five weight- percent Uranium 235 is small compared to the total number of fuel rods. See the NRC safety evaluation (ML23093A028) for further details.

C. The Exemption is Consistent with the Common Defense and Security.

The proposed exemption would allow the use of four LTAs with a variant cladding material. This change to the plant core configuration has no impact on security issues. Special nuclear material in the LTAs will continue to be handled and controlled in accordance with applicable regulations. Therefore, the common defense and security is not impacted by this exemption.

D. Special Circumstances

Special circumstances, in accordance with 10 CFR 50.12(a)(2)(ii), are present whenever application of the regulation in the particular circumstances would not serve the underlying purpose of the rule or is not necessary to achieve the underlying purpose of the rule. The underlying purpose of 10 CFR part 50, Appendix K, Section I.A.5 is to establish acceptance criteria for ECCS performance. In the safety evaluation (SE)

¹ As stated in the May 5, 2023, supplement, the LTAs will not be placed in core regions that have been shown to be limiting with respect to the control rod ejection analysis.

contained in ML23093A028 for the license amendment request, the NRC staff evaluated for Vogtle, Unit 2, four LTAs that demonstrated the acceptability of the AXIOM cladding under LOCA conditions. The unique features of the LTAs were evaluated for effects on the LOCA analyses. The results showed that the LTAs would not adversely affect ECCS performance. Since the Baker-Just equation presumes the use of zircaloy or ZIRLO clad fuel, strict application of this provision of the rule would not permit use of the equation for AXIOM cladding for determining acceptable fuel performance. Therefore, the NRC staff concludes that application of the cladding material applicability requirements of the Baker-Just equation of 10 CFR part 50, Appendix K in this particular circumstance is not necessary for the licensee to achieve the underlying purpose of the rule.

E. Environmental Considerations

With respect to its impact on the quality of the human environment, the NRC has determined that the issuance of the exemption discussed herein meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). The NRC staff's determination that all of the criteria for this categorical exclusion are met is as follows:

The regulation 10 CFR 51.22(c)(9) states:

Issuance of an amendment to a permit or license for a reactor under part 50 or part 52 of this chapter that changes a requirement or issuance of an exemption from a requirement, with respect to installation or use of a facility component located within the restricted area, as defined in part 20 of this chapter; or the issuance of an amendment to a permit or license for a reactor under part 50 or part 52 of this chapter that changes an inspection or a surveillance requirement; provided that: (i) The amendment or exemption involves no significant hazards consideration; (ii) There is no significant change in the types or significant increase in the amounts of any effluents that may be released offsite; and (iii). There is no significant increase in individual or cumulative occupational radiation exposure.

Staff Analysis: The exemption is from requirements with respect to the installation or use of facility components located within the restricted area as defined in 10 CFR part 20. The criteria for determining whether an action involves a significant hazards consideration are found in 10 CFR 50.92. The proposed action involves

installed four LTAs. As stated in the evaluation in ML23093A028, the Commission has previously issued a proposed finding that the amendments involve no significant hazards consideration, published in the *Federal Register* on November 8, 2022 (87 FR 67508), and there has been no public comment on such finding.

The proposed action involves installing four LTAs, and as the NRC staff evaluated under the SE contained in ML23093A028, this action does not involve any significant changes in the types or significant increase in the amounts of any effluents that may be released offsite.

The proposed action involves installing four LTAs, and as the NRC staff evaluated under the SE contained in ML23093A028, this action does not involve any significant increase in individual or cumulative occupational exposure.

Based on the above, the NRC staff concludes that the proposed exemption meets the eligibility criteria for the categorical exclusion set forth in 10 CFR 51.22(c)(9). Therefore, in accordance with 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the NRC's issuance of this exemption.

IV. Conclusions.

Accordingly, the NRC has determined that, pursuant to 10 CFR 50.12, the exemption is authorized by law, will not present an undue risk to the public health and safety, and is consistent with the common defense and security. Also, special circumstances, pursuant to 10 CFR 50.12(a)(2)(ii), are present. Therefore, the NRC hereby grants SNC an exemption from the requirements of 10 CFR part 50, appendix K to allow the use of AXIOM fuel rod cladding material in LTAs 7ST1, 7ST2, 7ST3, and 7ST4 for up to two cycles of operation at Vogtle, Unit 2.

Dated at Rockville, Maryland, this 1st day of August, 2023

For the Nuclear Regulatory Commission.

/RA/

Bo M. Pham, Director,
Division of Operating Reactor Licensing,
Office of Nuclear Reactor Regulation.

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